4.5

ISOSCELES AND EQUILATERAL TRIANGLES

6. Which of the following figures has the greatest number of lines of symmetry?

(A) equilateral triangle **(B)** non-square rhombus

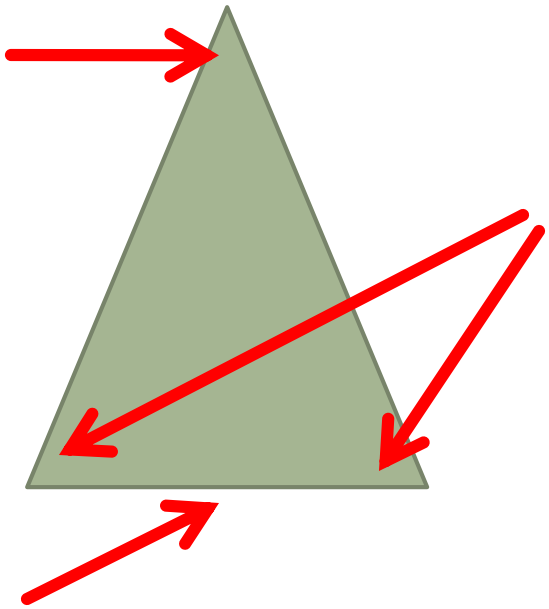
(C) non-square rectangle **(D)** isosceles trapezoid **(E)** square

7. Using only pennies, nickels, dimes, and quarters, what is the smallest number of coins Freddie would need so he could pay any amount of money less than a dollar?

(A) 6 **(B)** 10 **(C)** 15 **(D)** 25 **(E)** 99

Review: Definition of an Isosceles Triangle

A triangle with two congruent sides.



Parts of an Isosceles Triangle

Exploring...

Base Angles Conjecture

(Go to sketch 4.5 – Isosceles Triangles)

What would you conjecture is the relationship of the base angles of an isosceles triangle?

_____

_____

Complete the following:

If a triangle is isosceles, then the _____ _____ _____

_____.

State the converse of this:

_____

_____

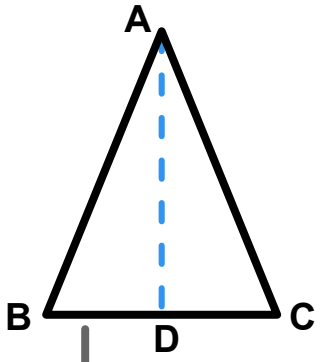
Do you think the converse is true? _____

Proof of the Base Angles Theorem

Given: $\overline{AB} \cong \overline{AC}$

$\overline{AD}$ bisects $\angle A$

Prove: $\angle B \cong \angle C$



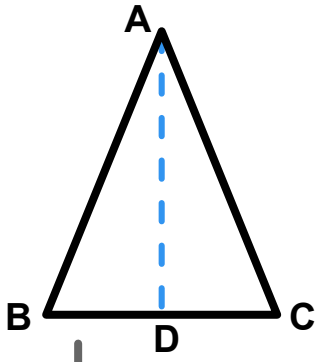
Statements	Reasons

Proof of the Converse of Base Angles Theorem

Given: $\angle B \cong \angle C$

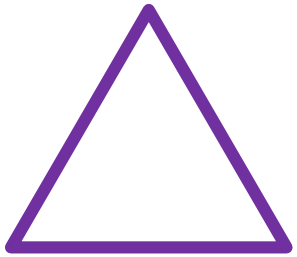
$\overline{AD}$ bisects $\angle A$

Prove: $\overline{AB} \cong \overline{AC}$



Statements	Reasons

Equilateral Triangles Conjecture



What would you conjecture is the relationship of the all the angles of an equilateral triangle?

_____

_____

Complete the following:

If a triangle is equilateral, then it is _____.

State the converse of this:

_____

_____

Do you think the converse is true? _____

Base Angles Theorem

POK

If a triangle is _____ , then the _____ _____ are _____.

Converse of the Base Angles Theorem

POK

If the _____ _____ are congruent, then the triangle is _____.

Equilateral Triangles Theorem

POK

If the triangle is _____, then it is _____.

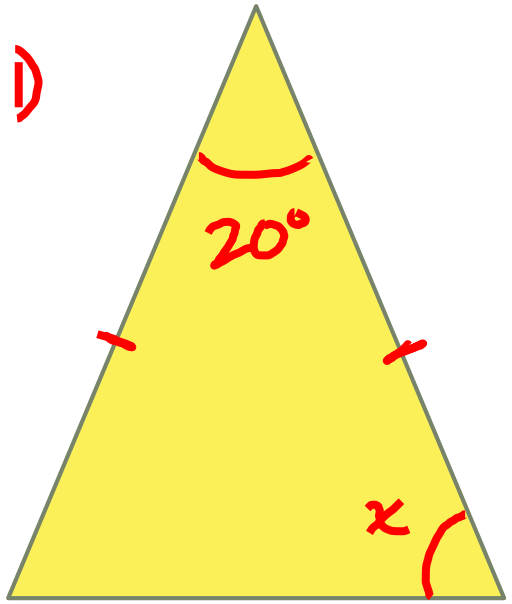
Converse of the Equilateral Triangles Th.

If the triangle is _____, then it is _____.

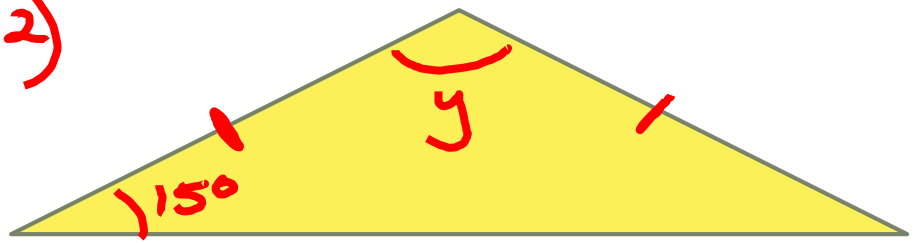
POK

PRACTICE

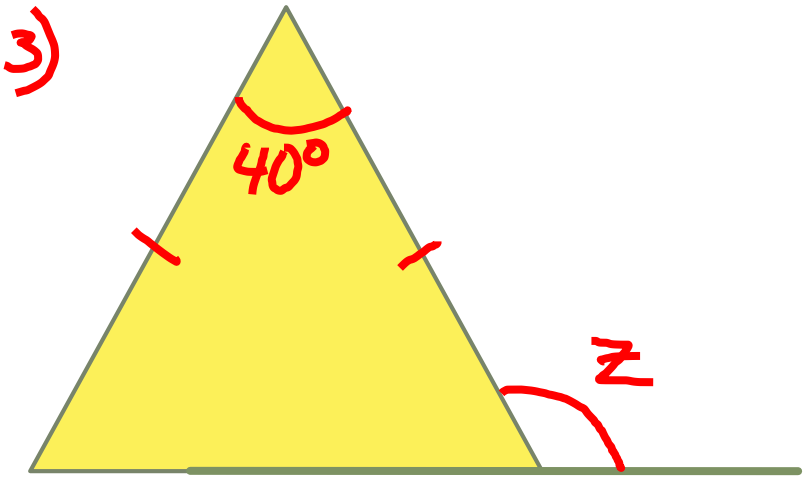
1)



2)

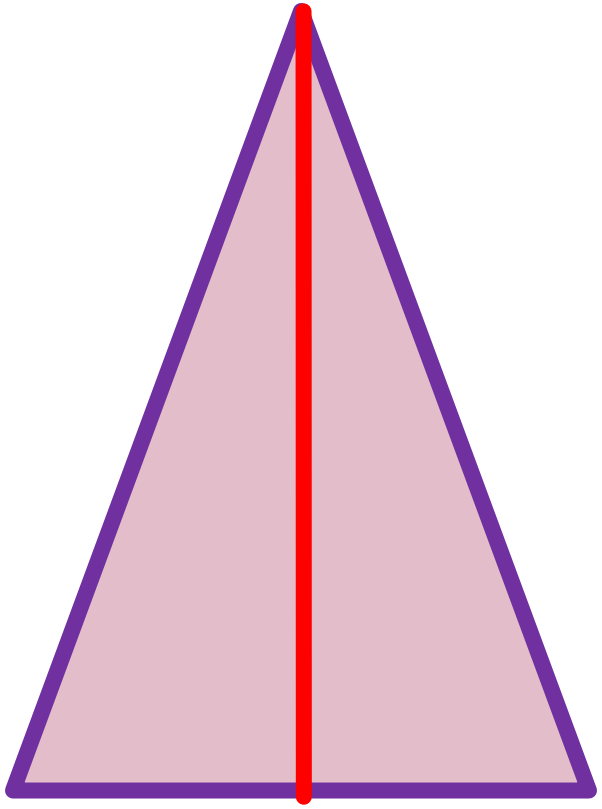


3)



Conjectures with the vertex angle bisector

If a segment bisects the vertex angle, what relationship do you think it has with the base?



_____

_____

_____

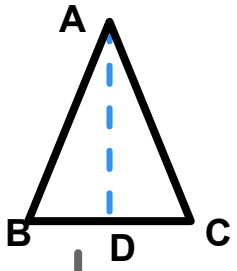
_____

Proof of Vertex Angle Bisector Theorem (Part 1)

Given: $\overline{AB} \cong \overline{AC}$

$\overline{AD}$ bisects $\angle A$

Prove: $\overline{BD} \cong \overline{CD}$ & $\overline{BC} \perp \overline{AD}$



Statements	Reasons
$\overline{AB} \cong \overline{AC}$	
$\overline{AD}$ bisects $\angle A$	
$\angle BAD \cong \angle CAD$	
$\overline{AD} \cong \overline{AD}$	
$\Delta BAD \cong \Delta CAD$	
$\overline{BD} \cong \overline{CD}$	
$\angle BDA \cong \angle CDA$	
$m\angle BDA \cong m\angle CDA$	
$m\angle BDA + m\angle CDA = 180$	
$m\angle BDA + m\angle BDA = 180$	
$2m\angle BDA = 180$	
$m\angle BDA = 90$	
$\overline{BC} \perp \overline{AD}$	

Vertex Angle Bisector Theorem

If a segment _____ the vertex angle of an isosceles triangle, then the segment is also the _____ _____ (the altitude and the median) of the base.